

# BOT INVESTMENT IN CHINA HYDRO POWER PROJECT MARKET AND STRATEGY

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## **Abstract**

China power market is fast changing. The strong economic growth does make BOT power projects to be one of the focuses for investment in China due to the huge demand for energy by the Chinese government. Since late 80's, various power projects BOT studies have been carried out but appear too fragmented which fail to linked the BOT studies to the most recent government policies' changes or market movement. This study has carried out analysis on the recent changes in China power industry reform and local government authority empowerment. The impact of those changes to BOT investment has been identified and recommendations have been made on the new opportunities and new strategies especially from the Singapore's investors' point of view. A case study on BOT hydropower plant has been presented which could be a suitable model for Singapore investors.

## **1.0 Introduction**

China now ranks as the world's second largest energy consumer with an estimated 300 gigawatts of installed capacity[1], second only to the US on that count. With a steady economical growth of at least 7%, China's power demand is also forecast to reach 4,000 terawatt-hours by 2020[2] that requires an estimated installed capacity of 1,000 gigawatts. Continuing with this rapid growth in demand, the Chinese government has started implementing various reforms in the power sections to boost the BOT based projects. These reforms will present the investors with new challenges and at the same time, new opportunities.

China's energy sector is distinctive for its heavy reliance on coal. Almost three-quarters of China's electricity is generated by burning coal compared with 5% from hydropower and 1.4 billion tons of coal are consumed in China every year[3]. As China plans to quadruple its economy by 2020, if it continues on the traditional growth path, energy consumption in China will surge to 3.3 billion tons of standard coal by then.

China past BOT power project is also distinctive for coal-fired plant. It could be due to two reasons, one is that relatively low capital investment is involved compared with hydropower project, another is that due to the two model BOT projects, LaiBin B and ShaJiao B where the successful precedence has been set up.

However, environmental problems associated with heavy reliance on coal has now become a major concern due to severe and expensive pollution that causes over US\$13 billions per year in damages to human health, agriculture and materials. Therefore in the new guidelines, the Chinese government has implemented strict controls on small to medium size (less than 300MW) coal-fired plants and has encouraged the use of clean/alternative energy [4]. In the China's Energy Strategy and Reform International Seminar held in Beijing from 15 to 17 2003, it was also pointed out that rather than only focus on securing enough resources to sustain economic development, China's energy policy should elevate the importance of conservation and environmental protection.

This is a major impact to investors without large capital as they have to re-consider the investment plan due to the restriction for small size coal-fired project.

Second noticeable reform is the changes in regulations on tariffs and power purchase agreements. Although China is still using the old "instruction" tariffs for state-owned power plants and "guidance" prices for new power plants that use funds from other sources, the government hopes to unify the price of electric within grid through the reform to enhance market transparency.

New regulations also openly condemn the minimum take-or-pay arrangement due to the fall out from some projects. This is a drastic change in the contract term which is routinely approved in the past. The State Power Corporation (SPC) effectively stated that power purchasers could no longer guarantee off-take.

The third noticeable reform is in the separation of generation and distribution of electricity [5]. The implementation of this reform plan will break-up the SPC effective monopoly and will separate commercial functions and governmental functions. This new move, which is on the way close to power deregulation in Britain in 1980's, will create a more competitive power market as a surge of privately invested plants and liberalize power market. This will request a huge demand for capital as happened in US.

Some similar changes in US could also be expected to occur in the project financing in China's BOT : long term off-take contracts for the electricity would be replaced by sales to spot market with fluctuating prices; limited recourse would become looser; elements of corporate finance would be added and utilities would be replaced by companies [6]. This will result in a more creative financing structure as stated in the same paper. Investors shall take into consideration of these possible changes and shall also look into the financing market in order to be more competitive in this liberalized China power market but not stick into the old structures.

The other important anticipated change from this reform could be associated power delegating down to the local government from the central government. The local provincial and city government could be expected to gain more authorities in handling power projects. This new move is to encourage the local government's initiatives in attracting foreign investment. Once the local government's project development master plan has been approved by superior level, the local government is authorized to exercising the options including calling tender, contract procurement and implementation. Therefore instead of going through the tedious procedure of gaining approvals direct from the central government, the investor could directly approach to the local provincial or even local city government for such BOT projects.

China power market is a promising but fast changing market. BOT in China is the focus in the coming decades as China needs billions of dollars of investment in her energy sector. Strategy plays the key role in success in China.

Singapore construction industry players are not strong enough compared with international player both financially and technologically. It is thus more important to select the niches when venturing into China. This includes identifying the right market and adopting the right strategy. However, it is noticed that majority China BOT project studies are focusing on the international players. There is a need to research in the area of BOT project that is more suitable for Singapore players. The recommended area could be projects with great mobility, relatively small investment capital and with large flexibility

This paper carried out research on the project size in the range of US\$ 100-200 million. A case study was presented to illustrate the distinctive features in contract procurement and its market strategies in coping with the new change in China power industry.

## **2. HEI HE XI GOU Project**

### **2.1 Project Overview**

Hei He city locates in the Hei Long Jiang Province of China. It is at the boarder with Russia. Electricity shortage becomes a major obstacle due to booming bilateral trade. The city government has proposed to convert the current hydro power plant into a pump and storage hydro power plant. The new system will enable the plant to enlarge its power supply capacity in peak hours and during non-peak hours, surplus power will be used to pump water back to upper reservoir from tail reservoir.

The development includes a new built tail storage reservoir and installation of two new turbine generator with capacity of 100MW each. Work also includes the associated spillway and channels. Construction period has been estimated as 5 years and the total project investment has been estimated as RMB 852,143,000 RMB Yuan(103 million USD). Operation life termed as 30 years. Whole project life lasts 35 years.

The estimated peak time power supply (priced at 0.823RMBY/KWh) by the new system is 307,050,000KWh per year. The power in pumping back storage is estimated as 382,350,000KWh (priced at 0.18RMBY/KWh) per year. The revenue generated from sales of electricity can reach RMB 252,702,150Yuan per year. The gross profit before tax is estimated to be 165,736,000 Yuan per year. The annual taxes generated during the operation life are estimated to be 59,242,000 Yuan per year. This yields an estimated IRR of 13.1% with Min. DSCR ranges within 1.5-2.0.

The financing plan by the city government is initially to raise 80% of total investment amount from local bank at interest rate of 5.76% and 20% of the total investment from own fund. The development plan has been granted approval from the provincial development planning committee. However, the city government needs to source for own financing on this project.

The city government also takes a proactive role in source for foreign investment in this project. This also includes BOT project option despite common choice of financial loan from foreign investors.

The city government has set up a project company in execution of the HEI HE XI GOU projects. Various commercial negotiations have been conducted on financing of this project. The most competitive proposal received to date is to make a BOT investment with a proposed operation period of 30 years.

The city government has insisted that the investors to put at least 20% of the total investment in equity forms in order to issue the government guarantee on the investor's loan. The Bank of China, Hei He Branch is the deliverer.

The project is still in final contract wrap up stage where both parties are negotiating final terms and conditions on the BOT arrangement. Several key points should be highlighted on this project which may be beneficial to Singapore investors for BOT project assessment and evaluation in China. First, it is a project of small to medium size capital. This is a suitable size for Singapore investors who are relatively weak in financing with international big players. Second, the local city government has played a vital role in the project selection and execution. This has avoided long approval procedures and evaluation process from the State Planning Committee. It is worthwhile for Singapore investors to note that the higher degree of liberty of the local government in foreign investment with the greater power been delegated. It is an indication on the new trend of China's BOT investment. Third, the innovation parts in the contractual issues. In stead the normal letter of comfort, the local government has issued government guarantee on the investor's loan. This has no doubt minimized the risk in the operation early stage risks such as fall in power purchase, drop in tariffs and project cost overflow etc. This arrangement should also favor the safe players, especially Singapore investors.

## **2.2 Financing Plan**

### **2.2.1 Project Investment**

The project investment is estimated as 852,143,000 RMB Yuan which includes construction cost of 763,160,000 Yuan, land acquisition cost of 22,870,000 Yuan and interest for construction period of 66,113,000 Yuan. The construction period is projected to be 5 years and the operation period is 30 years.

Please refer to Table 1.1 for details.

Item		(unit: 1,000 Yuan)
1	Total Construction Cost(1.1-1.6)	763,160
1.1	Preliminary Works	62,758
1.2	Structural Works	328,054
1.3	M&E Works	226,785
1.4	Metal Works	28,526
1.5	Misc.	67,037
1.6	Provisional Sum	50,000
2	Land Acquisition Cost	22,870
3	Interests in construction Period	66,113
4	Total Investment (1-3)	852,143

Table 1.1 Total Investment

### 2.2.2 Operating cost

The annual operating cost includes staff salary and welfare fund, maintenance cost, material cost, wear and tear, Misc. charges and electricity charges for pumping during the non-peak hours.

1. Salary and welfare fund: 66 staffs with an average annual salary of 30,000Yuan;
2. Maintenance cost: 1% of the total investment;
3. Material cost: 5 Yuan per kilo-watt installed capacity;
4. Wear and tear: 0.006 Yuan per kilo-watt-hours power generation;
5. Misc. charges: 24 Yuan per kilo-watt installed capacity;
6. Electricity charge for pumping: 0.18 Yuan per kilo-watt-hours power consumed.

The detailed operating costs are listed in Table 1.2.

Item	Yuan		(1,000 Yuan)
1. Salary and welfare	Avg. 30,000	66 staffs	1,980
2. Maintenance	1%	852,143,000	8,521
3. Material	5/KW	200MW capacity	1,000
4. Wear and tear	0.006/KWh	307,050,000KWh	1,842
5. Misc. cost	24/KW	200MW capacity	4,800
Operating charges		Sum of 1-5	18,143
6. Electricity for pumping	0.18/KWh	382,350,000KWh	68,823
	Total operating cost:		86,966

Table 1.2 Operating Cost

### 2.2.3 Construction Period Interest

The interest rate for the loan is at 5.76% compounded half annually. The total interests paid during the 5 years construction is 66,113,000 Yuan. Please refer to Table 1.3 for the detailed calculation.

5.76%	Year 1	Year 2	Year 3	Year 4	Year 5
Loan	53,726	83,642	109,895	156,906	206,359
Total Loan	53,726	137,368	247,263	404,169	610,528
Interest	1,547	5,504	11,077	18,761	29,224
Total Interest	1,547	7,051	18,128	36,889	66,113
				5-years total	66,113

Table 1.3 Construction Period Interest (unit: 1,000 Yuan)

#### 2.2.4 Taxes

Taxes comprise 1% after sale tax with additional 0.8% tax for city development and education on sales revenue and 33% corporate tax on profits. This is based on the current corporate tax regulation for normal enterprises. Tax rate does affect the overall investment return. In fact, tax rate could be considered as one of the key factors of the project success. However, the tax incentive for foreign investment has not been incorporated in the preliminary evaluation on HEI HE XI GOU project. This is due to the facts that the tax incentive varies greatly in different regions and the tax incentives have yet to be negotiated and affirmed. Therefore, the tax incentive will be discussed in the sensitivity analysis.

#### 2.2.5 Sensitivity Analysis

Three major factors have been studied which may affect the investment return. These factors are with greater degree of uncertainty. They are:

1. Taxes;
2. Electricity sales quantity and tariffs;
3. Operation Period.

The interest rate has not been discussed due to the fact that this is a less uncertain factor compared with the other three factors.

##### 1. Sensitivity to Tax:

Two studies have been carried to simulate different tax incentive schemes. The first is the situation where 10% rebate in income tax has been introduced. A 10% rebate to the current 33% corporate tax rate will bring the IRR to 14.1% with Min. DSCR of 1.53. This result apparently makes this investment more comfortable to the investors.

The second is the situation where the tax is waived for the first three operation years. The IRR is now 14% and the Min. DSCR is 1.75 now.

Tax incentive is one of the measures which are used by Chinese government to attract foreign investment. The local government is also delegated with higher degree of authority in deciding the local tax incentive schemes. Therefore, foreign investors should put great effort in negotiating these terms. These need the foreign investors to have a detailed understanding in tax laws, regulations and local practices.

The Singapore investors are often used to the laws and regulation which have been set and have been used as common practices. So the procedures are followed. And most of the times they are reluctant to try to get special incentives but rather to follow the general incentive guidelines set by the central government. This could be mainly due to the overlook in the local government's authority.

## 2. Electricity sales quantity and tariffs

Studies on electricity sales rise and drop by 10% respectively were carried out. This is the same situation when tariffs rise or drop by 10%.

IRR will rise to 14.7% when electricity sales or tariffs rise 10% and the Min DSCR will be 1.63. IRR will drop to 11.3% and Min. DSCR then will be 1.28. The latter could not be a favorable investment plan anymore.

Electricity sales quantity is a major risk in power BOT projects. As there is no more guaranteed minimum purchase agreement from the local government, the investors have to find ways to mitigate such as risk. And studies also show that the BOT investment return is quite sensitive to the tariffs and electricity purchase quantity. Meizhou Wan and Houshi power generation projects are two recent cases where the plants have to sell the power at steep discount due to over supply in the region.

Although there is no more minimum purchase or take-or-pay guarantee from the government, the investors shall try to negotiate other forms of guarantee from the local government without breaching the rules and regulations. Some are: performance guarantee, loan payment guarantee co-issued with insurance agencies etc. All these need a close work with the local government and a well understanding of all governing rules and regulations.

## 3. Operation Period

The operation periods of 15 years and 20 years were studied separately. The IRR are 11.2% and 12.3% respectively. The Min DSCRs are both 1.46.

The operational period does not affect the Min DSCR as long as there is no changes in the loan repayment scheme. However, it affects the IRR. The investors can carry out similar study on the operation period's impact on the investment return in order to address the risks in force majeure or due to changes in law, policies etc where the investment plan could not be completed as scheduled.

## 2.3 Contractual Agreements

Although the local government is able to secure the bank loan from local Chinese banks, the officials are still keen to source for foreign investment. This could be mainly due to the facts that the volume of foreign investment attracted into local government would be a major consideration in the performance appraisal.

There are two major treatments in the procurement of contracts in this project to be highlighted. First, the local government has provided a government guarantee for the

invested sum. It states that the government would pay the uncovered balance either in the case of poor sales or due to unpredicted factors such as change in policy.

Second is that the provincial power authority has not guaranteed purchase volume, but instead, they provide in principal approval on the tariffs. This at least provides a form of guarantee in the revenue.

It is quite unusual that such government guarantee on the investment sums could be granted. This gives at least two signs, one is that the local government has greater authorities in deciding foreign investment with higher degree of flexibility. The other is that investors have the opportunity to negotiate better terms in the contract. To take note is that this does not breach the China's regulation which stipulates that no minimum purchase would be guaranteed by the government. It chooses another form of guarantee without breaching the rules and regulations.

This case shows that a thorough studies on the China local legislation as well as the government makes the contract much comfortable and secure.

Some key factors in this project which would be helpful to Singapore investors are:

1. This is a small to medium size project. The capital investment required is around US\$110 million. Unlike huge infrastructure BOT which involves over thousand of millions, the project size is quite suitable for Singapore investors who has relatively limited financing resources.
2. The project is not to build a whole new power plant but to upgrade the existing one. Therefore less risk is expected in both project execution and operation period due to there are already trained personnel available. This is also a new trend in foreign investment in China, i.e. to upgrade and re-develop or regroup and reform the existing facilities instead of build the new ones.
3. Investors shall conduct a detailed and in depth study on China's law and legislation, government procedures as well as the region before forming their strategies. The investors must be able to find what the local government's need in the BOT project in order to form the strategy and to raise proposal. This will help the investors to find a best way in the investment. Hei He Xi Gou project shows that the benefits from such works.

### 3.0 Conclusion and Recommendations

The drastic change in the business environment in China's market offers new opportunities for Singapore investors.

Past experience from Singapore investors has suggested the major obstacles which could be summarized in the following:

Legal: Chinese laws and regulations are major obstacles to BOT investment in infrastructure. Among the issues identified are:

- a) The need for a comprehensive legal framework to consolidate the various pieces of regulation.
- b) The legal system leaves many important, routine decisions to administrative



authorities, through an approval process that should be streamlined.

- c) The rules, institutions, and instruments of independent regulation have not yet been developed.

Financial: Most of the BOT investment in China's infrastructure has been foreign and has been primarily equity, with little debt financing. To ensure sustainable foreign capital inflows several issues should be carefully addressed:

- a) The need for sustainable financing for infrastructure projects requires that risks be balanced with government and investors.
- b) Project finance measures need to be better defined.
- c) Although the Law has played a crucial role in China's efforts to provide an enabling investment environment, its implementation should be strengthened.

Sector issues: Although the two sectors considered have achieved different levels of private participation, the common themes are:

- a) The need to ensure financial viability.
- b) The need to clarify government policy.
- c) The need for greater support from the center for the local municipalities and provinces that must undertake the majority of the reforms.

In general, the strategy should generally consider niches in four aspects, namely, the legislation, government support, financial and technical.

The Singapore investors shall first define a good law basis for their venture in China. This needs a comprehensive study on various laws of the PRC. It also requires the investors to constantly study the updates in legislation. Some investors may overlook the law aspects probably due to the poor law system in the past decades in China as well as the ineffective law enforcement. However, it must be pointed out that the new trend in China is towards comprehensive legislation framework. Law aspect would be addressed in another research paper.

In the meantime, Singapore investors shall also try the best to obtain local government support in project execution. This is due to the recent trend that the local authorities have been assigned more powers in handling local/provincial foreign investment projects. The restrictions have been reduced tremendously with great incentives, especially in the vast west and northern east regions. The Chinese government is trying to encourage foreign investment in these two regions by delegating down the powers. This is the aspect where Singapore investors are likely to overlook.

Financing and technology are another two major aspects in forming strategies. It must be realised that financing is also in fierce competition. Singapore investors have to compete with other foreign countries from Europe, Japan, North America and Australia. These competitors tie large sums of multilateral-sourced funding by co-financing operations and by offering low-interest "soft" loans and extended repayment terms. Foreign government representatives act as development consultant and provide local Chinese authorities with free technology demonstrations in order to lay the groundwork for follow on contract. Therefore close tie with financial institution is crucial. Meantime, government's support is also essential.

Financing used to be a more important part in winning the bid. But it should be pointed out that with higher client requirements, the technology becomes more and more crucial in

BOT projects. The local authorities are now focusing on not only the money but also the technology transfer. However, this still depends on the region. The investors should be able to identify the local authorities' needs.

It shall always be kept in mind that China is a market with fast changing paces. Therefore the investors must be able to catch up with the latest moves, changes and reforms. Among these, a clear picture in the policy and close ties with the local government are the most two important factors for successful BOT projects.

Future researches are recommended to be carried out in mainly three areas.

First is the continuous study of policies and laws of China. This is a focus in the latest development of China's market and to keep up with the economic development trend. Only by knowing what the market wants can the investors form the right strategies. This is especially critical for small to medium size investors. They must be flexible and sharp in finding out the niches in a most competitive market like China.

Second is the study in the financing. This study should be a focus in how to develop financing strength for Singapore's investors. This is a major weakness for Singapore investors which results in a loss in economic of scale compared with big international players. There is also less work done in this area.

Third is the study in technology. This study is to find out the advanced technology which could be used as a niche in China's BOT market. Some successful technologies have already been developed by Singapore investors and have been successfully implemented in China. Examples are town-planning technology and waste water treatment technology etc. However, more researches are still needed to be done since technology does change fast.

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